

CLAIM AMENDMENTS

1. (Currently Amended) An apparatus for controlling a power converter in which an output voltage is controlled by a pulse-width-modulation control, the apparatus comprising:
a voltage-vector control unit that determines, based on a voltage instruction value for the power converter, a voltage vector output from the power converter in one control cycle of the pulse-width-modulation control and a time-to-output of outputting of the voltage vector;
a voltage-vector adjusting unit that adjusts the time-to-output of outputting of the voltage vector in such a manner so that a the time-to-output of outputting of a zero-voltage vector is ensured at least for a constant longer than a fixed time or zero; and
a firing-pulse generating unit that generates a signal for turning on and off a semiconductor switching element included in the power converter based on the time-to-output of outputting of the voltage vector as adjusted by the voltage-vector adjusting unit.

2. (Currently Amended) ~~An The apparatus for controlling a power converter in which an output voltage is controlled by a pulse-width-modulation control, the apparatus comprising: a voltage-vector control unit that determines, based on a voltage instruction value for the power converter, a voltage vector output from the power converter in one control cycle of the pulse-width-modulation control and a time to output the voltage vector, according to claim 1, wherein the voltage-vector adjusting unit that adjusts the time to output of outputting of the voltage vector in such a manner so that~~

~~when a the time-to-output a of outputting of the~~ zero-voltage vector is longer than a predetermined time, the time-to-output of outputting the zero-voltage vector is ensured at least for ~~a constant~~ the fixed time, and

~~when the time-to-output of outputting of the zero-voltage vector is shorter than the predetermined time, the time-to-output of outputting of the zero-voltage vector is set to becomes zero; and~~

~~a firing-pulse generating unit that generates a signal for turning on and off a semiconductor switching element included in the power converter based on the time to output the voltage vector adjusted by the voltage-vector adjusting unit.~~

3. (Currently Amended) ~~An The apparatus for controlling a power converter in which an output voltage is controlled by a pulse-width-modulation control, the apparatus comprising: a~~ according to claim 1, wherein, when the voltage-vector control unit that determines, based on a voltage instruction value for the power converter, a receives the voltage vector output from the power converter in more than one control cycle of the pulse-

width-modulation control and a time to output the voltage vector, a voltage-vector adjusting unit that adjusts the time to output the voltage vector in more than one control cycle of the pulse-width modulation control in such a manner that, when as a unit, if a total of a the time to output a of outputting of the zero-voltage vector in more than one control cycle is shorter than a predetermined time, the voltage-vector adjusting unit adjusts the time of outputting of the voltage vector so that

a time the output of outputting of the zero-voltage vector between two adjacent cycles is set to becomes zero, and

an amount of the time to output of outputting of the zero-voltage vector between the two adjacent cycles is distributed to the a time to output of outputting of the zero-voltage vector in control cycles previous and next to the two adjacent cycles, and a firing-pulse generating unit that generates a signal for turning on and off a semiconductor switching element included in the power converter based on the time to output the voltage vector adjusted by the voltage-vector adjusting unit.

4. (Currently Amended) An The apparatus for controlling a power converter in which an output voltage is controlled by a pulse-width modulation control, the apparatus comprising a according to claim 1, wherein, when the voltage-vector control unit that determines, based on a voltage-instruction value for the power converter, a receives the voltage vector output from the power converter in more than one control cycle of the pulse-width-modulation control and a time to output the voltage vector, a voltage-vector adjusting unit that adjusts the time to output the voltage vector in more than one control cycle of the pulse-width modulation control in such a manner that, when as a unit, if a total of a the time to output a of outputting of the zero-voltage vector in more than one control cycle is shorter than a predetermined time, times to output same the voltage vector adjusting unit adjusts the time of outputting of the voltage vector so that times of outputting identical voltage vectors in more than one control cycle are added; and a firing-pulse generating unit that generates a signal for turning on and off a semiconductor switching element included in the power converter based on the time to output the voltage vector adjusted by the voltage-vector adjusting unit grouped into one.

5. (Currently Amended) An The apparatus for controlling a power converter in which an output voltage is controlled by a pulse-width modulation control, the apparatus according to claim 1, further comprising:
a voltage-vector control unit that determines, based on a voltage-instruction value for

~~the power converter, a voltage vector output from the power converter in one control cycle of the pulse-width modulation control and a time to output the voltage vector;~~

a delay unit that delays the voltage vector output from the voltage-vector adjusting unit by the one control cycle, and outputs the voltage vector to the voltage-vector adjusting unit, wherein a voltage-vector adjusting unit that adjusts the time to output the voltage vector in such a manner that, when a the time to output a of outputting of the zero-voltage vector is shorter than a predetermined value, upon receiving a voltage vector used for an adjustment in a previous control cycle, depending the voltage-vector adjusting unit adjusts the time of outputting of the voltage vector based on whether a vector lastly output in the previous cycle is a zero-voltage vector, so that

~~one of times to output of outputting of a zero-voltage vector at a current cycle is set to becomes zero, and~~

an amount of the one of the times of outputting of the zero-voltage vector is distributed to other another of the times; a delay unit that delays the voltage vector output from the voltage-vector adjusting unit by the one control cycle, and outputs the voltage vector to the voltage-vector adjusting unit; and a firing pulse generating unit that generates a signal for turning on and off a semiconductor switching element included in the power converter based on the time to output of outputting the zero-voltage vector adjusted by the voltage-vector adjusting unit.

6. (Currently Amended) ~~An The apparatus for controlling a power converter in which an output voltage is controlled by a pulse-width modulation control, the apparatus according to claim 1, further comprising:~~

~~a voltage-vector control unit that determines, based on a voltage instruction value for the power converter, a voltage vector output from the power converter in one control cycle of the pulse-width modulation control and a time to output the voltage vector;~~

a delay unit that delays the voltage vector output from the voltage-vector adjusting unit by the one control cycle, and outputs the voltage vector to the voltage-vector adjusting unit

a voltage-vector adjusting unit that adjusts the time to output the voltage vector in such a manner that, wherein upon receiving a voltage vector used for an adjustment in a previous control cycle and a time to output of outputting of the voltage vector, when a total of a first time to output of outputting of a zero-voltage vector lastly adjusted in the previous cycle and a second time to output of outputting of a zero-voltage vector firstly in a current cycle is shorter than a predetermined time, the voltage vector adjusting unit adjusts the time

~~of outputting of the voltage vector so that the second time is adjusted to be becomes a time obtained by subtracting the first time from the predetermined time; a delay unit that delays the voltage vector output from the voltage vector adjusting unit by the one control cycle, and outputs the voltage vector to the voltage vector adjusting unit; and a firing pulse generating unit that generates a signal for turning on and off a semiconductor switching element included in the power converter based on the time to output the voltage vector adjusted by the voltage vector adjusting unit.~~

7. (Currently Amended) ~~An The apparatus for controlling a power converter in which an output voltage is controlled by a pulse width modulation control, the apparatus according to claim 1, further comprising:~~

~~a voltage vector control unit that determines, based on a voltage instruction value for the power converter, a voltage vector output from the power converter in one control cycle of the pulse width modulation control and a time to output the voltage vector;~~

~~a delay unit that delays the voltage vector output from the voltage vector adjusting unit by the one control cycle, and outputs the voltage vector to the voltage vector adjusting unit voltage-vector adjusting unit that adjusts the time to output the voltage vector, including a function of calculating, wherein~~

~~the voltage vector adjusting unit calculates an error accompanied by an adjustment of the time to output of outputting of the voltage vector, in such a manner that, regarding a time to output a voltage vector obtained and adjusts the time of outputting of the voltage vector by correcting the voltage vector in a current cycle with the error calculated in a previous cycle,~~

~~when a time to output of outputting of a zero-voltage vector is longer than a predetermined time, the time to output of outputting of the zero-voltage vector is ensured at least for a constant the fixed time, and~~

~~when the time to output of outputting of the zero-voltage vector is shorter than the predetermined time, the time to output of outputting of the zero-voltage vector is set to becomes zero; a delay unit that delays the voltage vector output from the voltage vector adjusting unit by the one control cycle, and outputs the voltage vector to the voltage vector adjusting unit; and a firing pulse generating unit that generates a signal for turning on and off a semiconductor switching element included in the power converter based on the time to output the voltage vector adjusted by the voltage vector adjusting unit.~~

8. (Currently Amended) The apparatus according to claim 1, wherein the voltage-vector adjusting unit adjusts the ~~time to output of outputting of~~ the voltage vector ~~in such a manner so that the time to output of outputting of~~ the zero-voltage vector is ensured at least for the ~~constant fixed~~ time without changing a relative ratio of output times of voltage vectors other than the zero-voltage vector.

9. (Currently Amended) The apparatus according to claim ~~2~~ 1, wherein the voltage-vector adjusting unit adjusts ~~time to output of outputting of~~ the voltage vector ~~in such a manner so that the time to output of outputting of~~ the zero-voltage vector is ensured at least for the ~~constant fixed~~ time without changing a relative ratio of output times of voltage vectors other than the zero-voltage vector.

Claim 10 (Cancelled).

11. (Currently Amended) The apparatus according to claim ~~2~~ 1, wherein when the time of outputting of the zero-voltage vector is set to zero, the voltage-vector adjusting unit adjusts the ~~time to output of outputting of~~ the voltage vector ~~in such a manner so that, when the time to output the zero-voltage vector is set to zero,~~ times to output of outputting voltage vectors other than the zero-voltage vector ~~are set to also become~~ longer than the ~~constant fixed~~ time or ~~set to zero, too~~.

Claims 12-14 (Cancelled).

15. (Currently Amended) The apparatus according to claim ~~2~~ 1, wherein, upon when setting the ~~time to output of outputting of~~ the zero-voltage vector set to zero, ~~when if~~ the voltage vector lastly output in the previous cycle is different from the voltage vector firstly output in the current cycle, the voltage-vector adjusting unit ~~changes~~ replaces the voltage vector firstly output in the current cycle ~~to with~~ the voltage vector lastly output in the previous cycle.

Claims 16-18 (Cancelled).